

**Claims**

1. A plant for the manufacture of glass stoppers provided with a head part for the closing of bottles, in particular of wine bottles and sparkling wine bottles,  
comprising a multi-part mold which determines, in the closed state, the negative contour of the stopper to be manufactured, a feeder system for supplying the mold with molten glass, a multistation press and an arrangement for the removal and for the further handling of the glass stoppers produced,  
characterized in that,  
the mold is formed by  
a base part (1) having a cut-out (7) corresponding to a first part length of a stopper;  
a middle part (2) of two part elements (8, 8') of a mold which are in particular displaceable relative to one another and perpendicular to the longitudinal axis (15) of the mold, which can be coupled in a self-centering manner and which determine a hollow space (9) corresponding to a second part length of a stopper and to at least a main region of the head part (11) in the coupled state and in the state contacting the base part (1);  
and an upper part (3) having a central pressing stamp (5) axially displaceable relative to the upper part (3) and closing the hollow space of the head part for the forming of a tolerance compensating recess (12) in the head part (11) of the stopper (10).
2. A plant in accordance with claim 1, characterized in that the hollow space (9) determined by the part elements (8, 8') of the mold forming the middle part (2) extends axially beyond the planar surface (14) of the head part (11) and bounds the head part (11) at its outer

periphery, on the one hand, and at a radially outwardly disposed marginal region of the planar surface (14), on the other hand.

3. A plant in accordance with claim 2, characterized in that the upper part (3) with a centrally guided pressing stamp (5) closing the hollow space of the head part has a ring nose (20) which engages in a shape-matched manner into the hollow space (9) determined by the part elements (8, 8') of the mold, with the outer diameter of the ring nose (20) being smaller than the outer diameter of the head part (11).
4. A plant in accordance with any one of the preceding claims, characterized in that the cut-out (7) of the base part (1) is bounded at the base side by a plunger (4) having an ejection function and whose end face is smaller than the base surface of the cut-out (7); and in that the base part (1) is in particular made in one part.
5. A plant in accordance with any one of the preceding claims, characterized in that the first part length of the stopper expands, preferably conically, starting from the base surface of the base part (1) and ends at a position (13) of discontinuity of the stopper diameter.
6. A plant in accordance with claim 5, characterized in that the part elements (8, 8') of the mold of the middle part (2), which can be coupled in a self-centering manner, form, on the one hand, the second part length of the stopper of in particular cylindrical shape and reduced diameter extending from the position (13) of discontinuity up to the head part (11) and, on the other hand, the

head part (11), preferably designed in disk shape, over practically its total height.

7. A plant in accordance with claim 6, characterized in that, when the mold is closed, the dividing line between the upper part (3) of the mold and the part-elements (8, 8') of the mold forming the middle part (2) of the mold is disposed beneath the planar surface (14) of the stopper (10) in the region of the stopper rounding.
8. A plant in accordance with any one of the preceding claims, characterized in that the upper part (3) of the mold forms a planar surface (14) on the disk-shaped head part (11), on the one hand, and a part region of the rounding, on the other hand, which merges into a cylindrical outer contour of the head part (11).
9. A plant in accordance with any one of the preceding claims, characterized in that the diameter of the pressing stamp (5) is larger than the diameter of the second part length of the stopper.
10. A plant in accordance with any one of the preceding claims, characterized in that the pressing stamp (5) is actuated in lagging manner with respect to the upper part (3) of the mold and a central compression spring, a plurality of compression springs (6) arranged in a ring shape or at least one pneumatic cylinder is/are fitted between the pressing stamp (5) and the upper part (3).
11. A plant in accordance with any one of the preceding claims, characterized in that the plunger (4) having an ejection function can be moved into a retraction position enlarging the mold depth during the feed process.

12. A plant in accordance with any one of the preceding claims, characterized in that, with the mold upper part (3) positioned with a lateral offset, the otherwise closed mold is fed by a feeder system designed for droplet operation with glass gobs which fall through the middle part of the mold without contact and whose diameter to length ratio is disposed in the range from approximately 1 : 3.5 and whose length is preferably selected to be larger than the depth of the hollow space of the mold.
13. A plant in accordance with any one of the preceding claims, characterized in that the station designed for the feeding of the mold with glass gobs is simultaneously made as a station for the carrying out of the pressing process.
14. A plant in accordance with any one of the preceding claims, characterized in that a fall and guide channel is provided in the feed station for the supply of glass gobs in a centered manner with respect to the mold from a pre-settable drop height.
15. A plant in accordance with claim 14, characterized in that the fall and guide channel extends with a slight inclination to the vertical lying in the range from approximately 2° to 8° and has, optionally, a large deflection radius on the mold side for the achievement of a vertical glass gob supply.
16. A plant in accordance with any one of the preceding claims, characterized in that a respective follow-up device is provided in each of one or more stations following the feed and press station

which acts mechanically or pneumatically on the recess (12) of the head part (11) of the stopper (10).

17. A plant in accordance with any one of the preceding claims, characterized in that a device becoming effective directly after the pressing process is provided for the short-term heating of the region of the recess (12) of the head part (11).
18. A plant in accordance with claim 17, characterized in that the end face of the pressing stamp (5) is concave in shape.
19. A plant in accordance with any one of the preceding claims, characterized in that at least the two part elements (8, 8') of the mold of the middle part (2) are fitted with complementary shape-matching members at the surfaces facing one another and contacting one another in the closed state and in that a cross centering device (21) is preferably provided between the middle part (2) and the upper part (3).
20. A plant in accordance with any one of the preceding claims, characterized in that each mold consisting of a base part (1), a middle part (2) and an upper part (3) are suspended in a mold holder (16) while forming a free space (17) on the base side.
21. A plant in accordance with claim 20, characterized in that the base part (1) and the middle part (2) is supported against vertical pressing forces which occur via a base part (18) associated with them.

22. A plant in accordance with any one of the preceding claims, characterized in that, for the continuous glass stopper production, a plurality of molds are arranged on a turntable and can be supplied via a single-drop feeder system or a double-drop feeder system with defined glass gobs via guide channels and the glass stoppers (10) solidified by convection cooling can be removed in a removal station downstream of the respective supply station from the respective mold by means of the plunger (4) provided on the base side and by means of a suction lifter and can be transferred onto a transport belt via a slide conveying device engaging at the head part (11).
23. A plant in accordance with claim 22, characterized in that a cooling track follows the transport belt and a respective plurality of stoppers (10) can be transferred into it simultaneously from the transport belt by a transverse displacement process.
24. A plant in accordance with claim 22, characterized in that a single-liner, a monitoring path and a station for the application of a seal are arranged downstream of the cooling track and a unit for the transfer of the finished stoppers onto a pallet is subsequently provided.
25. A plant for the manufacture of glass stoppers provided with a head part for the closing of bottles, in particular of wine bottles and sparkling wine bottles, comprising a multi-part mold which determines, in the closed state, the negative contour of the stopper to be manufactured, a feeder system for supplying the mold with molten glass, a multistation press and an arrangement for the removal and for the further handling of the glass stoppers produced, characterized in that

the mold is formed by  
a base part having a cut-out corresponding to a first part length of a stopper,  
a middle part of two part elements of a mold which are in particular displaceable relative to one another and perpendicular to the longitudinal axis of the mold, which can be coupled in a self-centering manner and which determine a hollow space corresponding to a second part length of a stopper and to at least a main region of the head part (in the coupled state and in the state contacting the base part;  
and an upper part having a central pressing stamp axially displaceable relative to the upper part and closing the hollow space of the head part for the forming of a tolerance compensating recess in the head part of the stopper, as well as a heating path which can be supplied with the stoppers produced and in which the stoppers are brought to a substantially uniform temperature throughout, and an adjoining fan air cooling path in which at least the outer region of the glass stoppers is intensely cooled and stabilized.

26. A glass stopper for the closing of bottles consisting of a stopper part substantially matched to the respective bottle opening, a head part adjoining the stopper part and a ring-shaped sealing element in particular arranged in the transition region from the stopper part to the head part,  
characterized in that  
the glass stopper is made as a pressed glass stopper and in that a plate-shaped or dish-shaped recess (12) is provided in the head part (11) adjoining the stopper part.

27. A glass stopper in accordance with claim 26, characterized in that the volume of the tolerance compensating recess of the glass gobs and/or of changes of the hollow space of the mold is variable with respect to a plurality of glass stoppers (10).
28. A glass stopper in accordance with claim 26 or claim 27, characterized in that the stopper part has a recess adjoining the head part (11) for the reception of a ring-shaped seal or a seal L-shaped in cross-section, wherein the part of the L-shaped seal disposed in the recess is designed somewhat in the manner of a bead and the part of the L-shaped seal adjoining the lower side of the head part is designed in the form of a flat ring.
29. A glass stopper in accordance with claim 28, characterized in that the seal consists of a natural material, in particular cork, or of a plastic material.
30. A glass stopper for the closing of bottles consisting of a stopper part substantially matched to the respective bottle opening, a head part adjoining the stopper part and a ring-shaped sealing element in particular arranged in the transition region from the stopper part to the head part,  
characterized in that  
the glass stopper is made as a thermally hardened pressed glass stopper and in particular in that a plate-shaped or dish-shaped recess is provided in the head part adjoining the stopper part.
31. A method of manufacturing glass stoppers provided with a head part for the closing of bottles, in particular of wine bottles and sparkling wine bottles, using a multi-part mold which is supplied with molten

glass via a feeder system and from which the glass stoppers are removed for the further handling,  
characterized in that  
the glass stoppers having a different inner temperature and outer temperature are heated after the press to a temperature substantially uniform throughout and are then intensely cooled, particularly with fan air, and are thus stabilized and hardened.

32. A method in accordance with claim 31, characterized in that the glass stoppers are heated to a substantially uniform temperature throughout, in particular in the range from approximately 500°C to 600°C, during simultaneous transport, in particular on a belt consisting of a wire mesh; and in that an intensive action of fan cooling air subsequently takes place for the thermal hardening of the glass stopper.